



CROSSTALK



News Bulletin of the TRW Amateur Radio Club

MEMBER ARRL CLUB NO 1658 MEMBER LAMARC

W6TRW REPEATER: 145.320/-0.6 (PL 2A)

UHF: 442.000 IN/447.000 OUT

CLUB CALENDAR FOR LATE DEC.'89 AND JAN.1990

Every Friday	Club Breakfast - Bldg. S cafeteria	7 AM
Every Wed.	Emergency Communications Team Checkin	Noon
Dec 19 Tues.	Club Meeting - use Hotline for info	Noon
Dec 30 Sat.	TRW/ARC Swapmeet, Marine & Aviation	7-11 AM
Jan 2 Tues.	EBM at Pizza Hut, El Segundo & Oceangate	5:30 PM
Jan 19 Fri.	DEADLINE for Crosstalk articles	11 PM
Jan 27 Sat.	TRW/ARC Swapmeet, Marine & Aviation	7-11 AM
Jan 30 Tues.	Club Meeting - use Hotline for info	Noon

HAM CALENDAR

Jan 6-7	ARRL RTTY Roundup
Jan 10	Microsat Launch: use Hotline for the latest
Jan 13-15	ARRL Jan. VHF Sweepstakes
Jan 27-Feb 4	ARRL Novice Roundup
Feb 17-18	ARRL DX CW Contest
Mar 3-4	ARRL DX SSB Contest

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IN THIS ISSUE.....

There are two articles on the upcoming Microsat launch on Jan. 10, 1990 from French Guyana. Our Club Oscar Station in Bldg. 65 will serve as the West Coast ground support station. A team from AMSAT will be here. Our hard-working group has been on it for the last several months but could still use some additional help -- see Jeff's (N9CZA) message. Use the Hot-line for the latest info. This space event will be the first for the history of the Club; many, many thanks to the dedicated group and others. Let us make it a success!

Paul, N6DMV, has just returned from Fiji on a DX expedition (the first one in the Club on an expedition?). He had a grand time with the natives plus pileups he had never experienced before. On top of that, he met some of his old friends in the air from his own country! How wonderful!

Finally, it is membership renewal time. Don't forget to fill in the App. form in the back.

Final Preparations Underway for January Microsat Launch

AMSAT is now performing final preparations for the Microsat launch, currently scheduled for January 10, 1990 at 5:35pm PST. Four Microsats and two UoSats will be launched from Korou, French Guyana aboard an Arienne-4 rocket. The primary payload is SPOT-2, a French earth resources satellite. After the launch, the satellites will be in a 10:30 AM/PM sun synchronous polar orbit, with a height of 822 kilometers and an orbital period of 101 minutes. On launch day the first two orbits will favor the East coast and the midwest, the third and fourth orbits will favor the West coast. A typical pass will last 15-20 minutes.

The TRW Amateur Radio Club is providing ground support for the mission, and will serve as the West coast ground station for the first week or so after launch. A team from AMSAT will be hosted by the club, and they will be using our Oscar station to bring the satellites on line, monitor the telemetry, and upload the flight software to the on-board-computers. After the satellites are up and running, other command stations will take over the day to day operations, and the club station will return to user mode. We plan to remain available, though, in case of a problem.

Final preparations have been taking place recently at the club station as well. We are adding some extra receivers to the station, to monitor all four microsats as they pass over. (Since the satellites will be released as a group from the same launch vehicle, they will be in the same orbit initially and we can use the same antenna to track them all. Eventually they will spread out around the orbit circle, but it will take several days.) Many thanks to Terry Thompson and Bill Shanney for lending the club their satellite transceivers for the launch. We are also in the process of building some audio boxes, designed by Larry Zendel, which will split off the receiver audio to a speaker, headphones, PSK modem, and tape recorder - with proper impedance matching and level control for each.

Here is a look at the time table at W6TRW between now and the launch:

Now until 1/5/90 ... final assembly and checkout of hardware and software. We will probably be at the shack quite a lot, so feel free to join us. If you'd like to call ahead, the shack number is 813-8569. And if you do come by, don't be surprised if we put you to work!

Sat. 1/6/90 Shack cleaning party after 9:30am. Coffee and donuts provided.

Wed. 1/10/90 **** LAUNCH DAY ****

5:35pm ... liftoff (carried live on W6TRW repeater, 145.32 Mhz)
~10:30pm ... AOS at W6TRW.

Week following the launch: we will need club members who are TRW employees to come over to the shack during working hours to escort the AMSAT team. Nights and weekends are easier to cover, we mainly need people during the day. Please let us know if you can help for an hour or two. A sign up sheet will be circulated at the December club meeting and will be available after that on the door of the club shack.

Tue. 1/30/90, Club meeting ... we will be showing video of the launch
E2/1200, noon and the ground support operations at W6TRW.

Thanks again to all the people who have contributed thus far on the project:
Carmin Gentile, John Keller, Rich Sauer, Bill Shanney, Jeff Shields,
Terry Thompson, Chris Wachs, Dave Williams, Larry Zendel, and Irv Zipper.

Further information will be posted on the TRW/ARC BBS and on WB6YMH-2 as it
becomes available. On the day of the launch, listen to the W6TRW repeater
for live audio from Korou and updates throughout the evening.
73 and CU on uSAT!

Jeff N9CZA

3D2 DXPEDITION (CONT. FROM P.7)

Checking out my gear, - not to have any surprises later -
revealed, that my VSWR/power meter or the 430S is acting funny.
This was surprise #9. Sometimes I was able to load to full power,
other times to only half power. VSWR values were different 3 out
of 5 times under the same operating conditions. Checking the an-
tenna, coax, transmitter did not show any sign of damage. (I
don't know why, I suddenly remembered the airport scene with the
flying suitcase!). It must be the meter! I took apart the very
small D'Arsonval movement and placed it on a window glass louver
turned horizontal. With the tropical sunshine hitting the glass
surface and by fine tuning the angle of incidence and reflection,
I could achieve a strong backlit condition and with the help of a
magnifying glass taped to my forehead + 2 eyeglasses for more
magnification, I was able to inspect the inner guts of the tiny
meter. First the problem did not show up (the meter was in the
horizontal position!) and I put the thing together 3 times for
nothing. Finally I realized that the orientation of the movement
was significant. By taking apart the thing the 4th time, I was
able to duplicate the problem. It turned out that the tiny hair
spring overhanging end bent just enough to rub gently against the
moving meter pointer intermittently due to the small radial move-
ment allowed by the needle bearings. A very delicate bend to the
hairspring cured the problem - the meter worked perfectly there-
after, defeating Murphy mercilessly. — BY N6DMV/3D2PL

(TO BE CONTINUED)

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Dec. issue of 73 has reviews on: Yaesu FT-470 2m/70cm HT
ICOM IC-2SAT pico-sized HT
Mirage D-15 70cm 18w brick

CQ has an article on a shortened One-element Rotary Antenna
for 28, 25, or 21 Mhz without a matching device for 50 ohms.

Hello All:

It is time again for a status report before we ship the Microsat birds to Kourou. The team leaves on December 1 from Colorado with the satellites. Various other team members will travel from around the world to the launch site in French Guiana on the northern coast of South America.

The latest official launch date from Arianespace is January 9, 1990 at 0140 UTC plus or minus a few minutes. Four Microsats and two UOSAT birds will ride on a small satellite shelf designed for missions such as ours under the SPOT-2 satellite. The launch window is determined by need for the primary mission, Spot-2, to be in a given sun-synchronous orbit. This will bring Spot-2, the Microsats, and the UOSAT's overhead at about the same time each morning and evening.

Spot-2 is an earth resources satellite with a high resolution camera. The Microsat's include two packet radio satellites, PACSAT and LUSAT, a camera and experiment satellite WEBERSAT, and a voice encoder educational satellite called DOVE (Digital Orbiting Voice Encoder). PACSAT is sponsored by AMSAT-NA and TAPR. LUSAT is sponsored by AMSAT Argentina. WEBERSAT is sponsored by the Center for Aerospace Sciences and Technology at Weber State College in Utah. DOVE is sponsored by Junior De Castro, PY2BJO, and Brazil AMSAT. All spacecraft had contributions made to them by the ARRL and its lab staff. The UOSAT satellites are done by the University of Surrey and are in the continuing tradition of UOSAT-9 and UOSAT-11.

This past week saw the finishing touches put on the initial flight software load. NK6K and N4HY worked on finishing off the software. Harold Price, NK6K finished the kernel, initial AX.25 software, the software loader, and the memory wash (to correct for radiation induced errors). Bob McGwier, N4HY finished the initial control code for each satellite.

On Thanksgiving day, N4HY, Jan King, W3GEY, Jeff Zerr, and Greg Hines, WTOM began making the final telemetry calibrations, and final testing of the battery charge regulation control loop, and the transmitter power control algorithm. All four Microsats had their algorithms extensively tested and the spacecraft were left running for days. The algorithms were run under simulation by simulating the solar arrays with a current limited power supply, various timers to simulate eclipses, and beginning from various states of battery charge. In every case, the overdamped control loops behaved perfectly. The hardware was extensively exercised under command code using AX.25 packets from a normal TNC. Various transmitters, experiments, etc. were tested. NK6K's memory wash routines and software loaders were repeatedly used without fault.

At last, an end to end test, from ground station to algorithm controlling the DOVE voice experiments, was performed. The Motorola 68HC11 in the DOVE module acting as a very smart UART chip, was sent a program from the spacecraft IHU and it then ran the digital to analog converter (DAC). This provided an end to end test on both hardware and software that until this test had been run, had never been exercised as a system. It was a working testimonial to the modular approach taken in the spacecraft design. On Tuesday, a program to exercise the digitalker, the VOTRAX SC-02 chip, was loaded and speech was produced from the DOVE spacecraft for the first time. The entire DOVE speech hardware has now been shown to produce the correct signals and signal levels. This will promise to be an extremely loud signal with a 4 watt transmitter and 4 Khz deviation.

CAST had WEBERSAT the week preceding these tests. They tested all the experiments on their 'attic' which sits on top of a normal Microsat configuration. During this period and the last testing that occurred in Boulder, several pictures have been taken and downloaded via the packet channel. The camera produces very good pictures and the mechanical iris functions well. The extensive environmental testing that has gone appears to have done no damage to the iris. This promises to be an extremely popular bird and satellite to watch (pun intended). Other than a minor accident requiring several hours of work to repair, these tests went off without a hitch.

Finally after several days of running the control algorithms on the spacecraft, after all spacecraft passed all their memory tests okaying a total of 32 Megabytes of storage, the control algorithms functioned appropriately, telemetry calibrated, and AX.25 being used to command the spacecraft, Jan King, W3GEY, project manager exclaimed that we had four live spacecraft, ready to begin on orbit operations.

There will be an extensive engineering test phase immediately after launch. It is vital that we have the cooperation of the amateur radio community. We must fine tune control algorithms in space, finish off the BBS code, hundreds of thousands of kilobytes of digitized voice must be uploaded to DOVE, and hours of upload of camera software to WEBERSAT must be accomplished. NK6K and N4HY will be spending numerous hours each day at their QTH's and at the TRW radio club in Redondo Beach, Ca. getting the spacecraft fully loaded with software and taking the pulse of the spacecraft. In addition to the Microsat's, NK6K and WB6YMH, Skip Hansen (who has written the low level I/O drivers for the Microsat's) have extensive software responsibility for UOSAT. This promises to be a busy time for all.

If the spacecraft are launched on time in January, do not expect full operations to begin before LATE FEBRUARY. Your cooperation will speed the process and possibly lead to an early release of these spacecraft for full use.

73 Bob

N4HY

er educational satellite called DOVE
(Digital Orbiting Voice Encoder). PACSAT is sponso

Grapevine rumors had it that K6KH, Spud of Manhattan Beach fame is planning a DXpedition to some remote-but-civilized part of the Globe. I knew Spud for many years from the Northrop RC, so I called him. Fiji! Sounds good, since I have never seen the South Pacific before. He was in the process by then of fabricating the portable antenna farm, an antenna tuner, etc. He said it was not too late for me to join. The rest is history, which pleasantly unfolded from here on with some interesting surprises.

The prerequisite is, of course, to obtain the necessary licenses and other documents prior to departure. I immediately set out to put the process in motion. I hastily filled out the questionnaire, which, among other things, had lines like these - exact quotes (surprise #1):

"Evidence of British nationality and two recent written references as to the character must be enclosed - see note (2)." Note (2): "The referees should be the person of British birth and standing, not related to the applicant." Under "Technical Qualifications" the text reads: "Have you obtained a pass in the City and Guilds of London Institute's Radio Amateurs." and "Have you passed the Post Office Hose Test for Radio Amateurs?"

It seemed first that they were painfully aware of the Medfly menace and the radios (or bodies) have to be decontaminated by hosing at the Post Office. My Encyclopedia Britannica does not references any Hose Test, so I assumed it must be Morse test. So it was.

Surprise #2: a few calls to the local L.A. Fiji Tourist Bureau resulted in a sympathetic response and the "British business" was waived in lieu of a xerox copy of my U.S. passport. The license fee is SF 10.0 which is \$ 7.00 U.S. Spud suggested that I send a few more \$\$ and ask them to reply via air mail, due to the long surface (water surface) mail turnaround time. At the time, this seemed to be a very good idea. A quick trip to B of A and an international money order for \$ 15.00 was on the way with all the requested information. I started gathering my stuff together and even purchased a bathroom scale for weighing my pretty heavy luggage to avoid going over the limits. The next few weeks were full with anticipation, hurrying home every day to see if my license arrived. About 3 weeks later the letter came. I opened it with excitement just to discover surprise #3: The money order was not accepted and was returned, they asked cash instead! Quickly a greenback 10+5 combination was inserted in an envelope and sent it off. About 3 weeks later the letter finally came, to discover surprise #4: The passport size photo of myself apparently did not strike a welcome note in Fiji, they asked for another. Running to the closest self-photo place, off it went - again!

In the mean time I decided to have an eyeball QSO with K6KH. Upon arrival at his house, surprise #5 flew in my face: Spud lives across the street in a house where I used to live for years, without knowing then - and until now - about his QTH! From here on, things picked up pace. The antenna factory was in full operation, some units were already completed. An other month flew by, and I was wondering about my license. I called KH on 600 ohms and he suggested not to worry, we will pick it up in Fiji. The same day surprise #6 set in: my 3D2PL license arrived and was no request for anything. But there was surprise #7 enclosed in the letter in the form of an official receipt for the \$10.00 I

sent - a very insignificant matter in light of the anticipated pleasures of a full-blown DXpedition!

By this time, everything was ready to go. K6KH ingeniously constructed antenna farm was neatly packaged and stored in his yard. Three 2 element beams were made for 10, 15 and 20M, 2 verticals, one for 40 and one for 80. Extended Zepp for 10, dipoles for 15 & 20. I carried enough wire + insulators for an 80 M dipole, for emergencies. The magic day of departure arrived: we were ready for a pre-departure party. The plane was leaving late night, so we got together in the afternoon for a get-aquainted/farewell/good luck/happy hour at KH's QTH. The DX party members were: K6KH/3D2KH + XYL Beall, Al, W6IM/3D2IM + XYL Nicole (oui, elle est Francaise) from San Diego, Irv, W6GC/3D2GC, Harold, N6AXQ and 3-Delta-2-Papa-Lima, alias N6DMV, me. After the consumption of a modest amount of bubbly DX catalyst, everybody felt great and was eager to go. KH's generous neighbor volunteered to deliver all of us to the airport in his large van. We picked up our luggage and loaded them in the van. The antenna farm was sent away earlier by freight plane. The beams and verticals were housed in 4 thin-walled aluminum irrigation tubes about 6 feet long. With coupling sleeves, the tubes could be assembled to form two 12 feet long antenna masts for the 15 & 20 M beams. With extension tubes attached, the beams were up to 25+ feet. The 10 M beam had a regular push-up mast. Handles taped to the tubes provided an easy transportation for the antennae.

After a long flight and a pause in Tahiti, we arrived in Nadi (pronounced: Nandi) airport, on the West Coast of the Island, but we had to go to the East Coast. (This was not a surprise). We picked up the antennae and luggage and proceeded toward the hired van. The airport luggage handlers piled up our stuff to about 7 feet high on two hand trucks. Surprise (not really) #8: one of topheavy luggage mountains tilted and overturned the truck, scattering all the luggage on the concrete. Since my 58 lbs. suitcase (limit is 60 lbs.) was wisely placed on top, it received the maximum impact on landing (**!!'0%"">'\$^!). I smiled, (what else could I do) because I was absolutely sure that my very thorough protective wrapping absorbed all the impact shock and the radio inside survived with g-s to spare.

Traveling toward the East Coast of Viti Levu, - the Main Island - on an excellent highway proved to be a very interesting, beautiful and scenic drive. We arrived to our destination (no surprises this time) and settled in two very comfortable villa houses each with 2 bedrooms and 2 hot/cold water bathrooms. The climate was absolutely delightful. Warm/hot and humid, but not uncomfortably so, clean, fresh air! The cab drivers, our caretaker staff and just about everybody greeted us with a big smile and a "Bula!" It turned out that Bula = hello, also, when raising the glasses, it is the proper thing to say.

Next day the antenna erection parties started, first we put up the wire antennae (fastest) to probe the propagation. Irv brought a G5RV with him, he strung it up in no time. Next the 40 and 80 verticals with 2 radials each went up. It turned out, that in several days time we were unable to make a single QSO on 80 due to the terrible QRM/QRN and loss of propagation. 40 was not much better, but we made a few contacts. Listening (really had to) WWV and WWVH at 18 and 45 minutes, respectively, after the hours did not promise too much either due to a recent magnetic storm.